

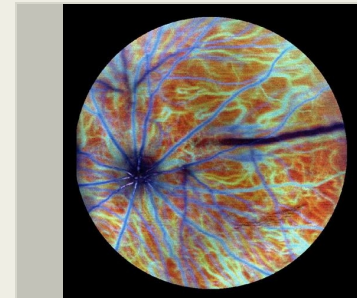
Optical System for Monitoring Net Occular Blood Flow, Phase I

Completed Technology Project (2015 - 2015)



Project Introduction

Physical Sciences Inc. (PSI) proposes to develop an advanced ocular imaging platform for comprehensive examination of the eye posterior segment (retina/choroid) based on non-invasive multimodal optical imaging techniques including Optical Coherence Tomography (OCT) and PSI's proprietary confocal line-scanning ophthalmoscopy (LSO). Software control of scan patterns and data processing and display/segmentation algorithms will accommodate a variety of novel approaches within a single optical platform, and enhance diagnostic capabilities to standard OCT and LSO-based techniques. In addition to structural information such as retina and choroid thickness maps and volume, quantitative and scalable tools for wide dynamic range blood flow metrics will be designed in Phase I and demonstrated in human volunteers and animal models in Phase II. Examining the retina and the choroid from a bulk perspective could provide important insights for elucidating short and long term effects of microgravity and fluid shifts specific to long duration space flights. Degenerative diseases of the eye often have either hemodynamic consequences or causes, though many mechanisms remain unknown. Microgravity-induced ocular functional and structural alterations have been experienced by several astronauts involved in long-duration space travels. Consequently, there is a clear need for advanced imaging modalities to monitor these effects. Improved blood flow imaging diagnostics will aid the detection and management of many eye conditions, and foster research on retinal function. The team assembled at PSI for the proposed research has extensive experience in developing ophthalmic instrumentation based on OCT and line-scanning techniques. Our skills cover all aspects of OCT imaging, image segmentation, layer thickness maps, visualization of retinal and choroidal vasculature, Doppler OCT, large-area line-scanning retinal imaging and Doppler flowmetry.



Optical System for Monitoring
Net Occular Blood Flow, Phase I

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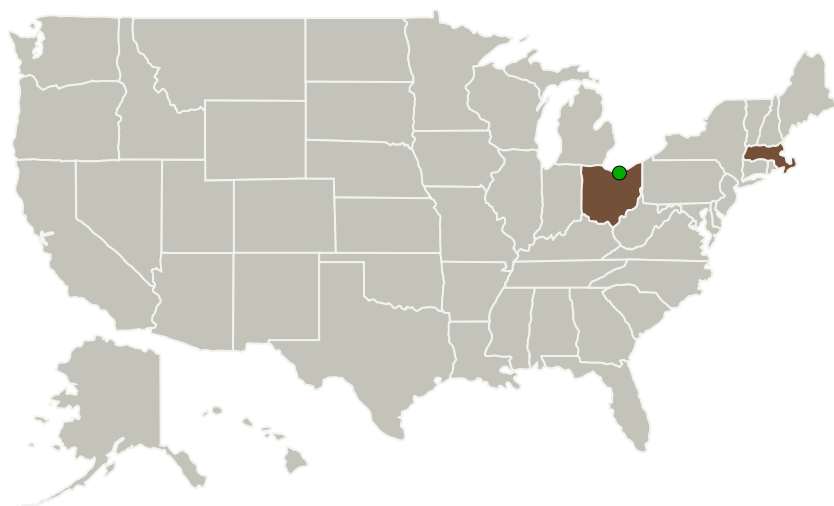
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Physical Sciences, Inc.	Lead Organization	Industry	Andover, Massachusetts
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Massachusetts	Ohio
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Project Transitions

**June 2015:** Project Start**December 2015:** Closed out**Closeout Summary:** Optical System for Monitoring Net Occular Blood Flow, Phase I Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139198>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

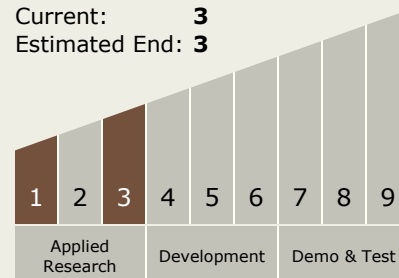
Carlos Torrez

Principal Investigator:

Mircea Mujat

Technology Maturity (TRL)

Start: **1**
 Current: **3**
 Estimated End: **3**

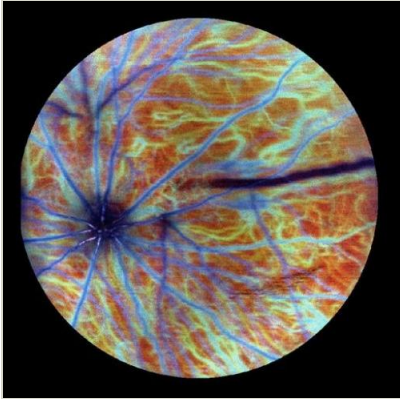


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Images



Briefing Chart Image

Optical System for Monitoring Net
Occular Blood Flow, Phase I
(<https://techport.nasa.gov/image/137277>)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System